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ABSTRACT

Teacher education faculty and library reference services personnel collaborated to introduce teacher education students to the use of modern technological resources and to encourage systematic thinking processes to address pedagogically based educational problems. Undergraduate students enrolled in an educational psychology class piloted the project. They were instructed in the use of the ERIC Database on CD-ROM, focusing on the ERIC Thesaurus, parsing, use of Boolean operators, limiting citations, and printing. Critical thinking concepts and systematic planning in decisionmaking were discussed in two subsequent classroom sessions. The students were asked to define and investigate an instructional problem, develop a rationale, construct research strategies, compile descriptors, search the ERIC database, and connect relationships of citations to their educational topic or problem. They reviewed the citations, summarized the data, drew conclusions, and cited recommendations and potential solutions to the problem. The final product consisted of a modified annotated bibliography. A survey of student perceptions of the project indicated that the students understood the potential of their exposure to the concepts of critical thinking, applications of systematic planning, and technological applications. They placed a high value on their instructional activities and were interested in having more such activities in their undergraduate preparation. (MAH)

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ED 399 251

Teaching Systematic Thinking and Problem Solving Through Database Searching, Synthesis and Analysis

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Abstract:

The objective of this presentation will be to describe a pilot project that was designed to introduce teacher education candidates to the use of modern technological resources and to encourage systematic thinking processes to address pedagogically based educational problems.

Implementation of the project was a collaborative effort between teacher education faculty and the library reference services. Undergraduate students enrolled in an educational psychology class were elected to pilot the project. A one hour Library Instruction session was provided in the use of the ERIC Database on CD-ROM. Instruction focused on using the ERIC Thesaurus, parsing, use of Boolean operators, limiting citations, and printing. This exercise was designed to help students develop basic competence and confidence with a computer system and, start an ERIC search on their own, as an end-user. Two subsequent classroom sessions were used to discuss critical thinking concepts and systematic planning in decision making. Students were asked to define and investigate an instructional problem, develop a rationale, construct search strategies, compile descriptors, search the ERIC database, and connect relationships of citations to the educational topic or problem they had identified. Finally they reviewed the citations, summarized the data, drew conclusions and cited recommendations and potential solutions to the problem. The actual search process was conducted by the students in pairs. Collaborative learning allowed students to coach each other through the search process.

The final product consisted of a modified annotated bibliography. Students were surveyed as to their perceptions on the strengths and weaknesses of the project. A summary of their responses revealed that although the number of computers they had access to was perceived to be limited, they realized the potential that being oriented to the concepts of critical thinking, applications of systematic planning and technological applications would have. They placed high value on the instructional activities and would like to see more of these activities in their undergraduate preparation. The students strongly recommended that the number of computers in the reference area be expanded and additional databases be provided.

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Teaching Systematic Thinking and Problem Solving Through Database Searching, Synthesis and Analysis

By: David R. Murray and Tom Graham, Alice Lloyd College

Introduction:

The two most talked about issues in academic circles today involve teaching college students how to think critically at a higher level and how to harness technology to access critical information. Both relate to the processes of inquiry and solving problems in the work place and in society in general. Many believe these two factors will ultimately be the driving forces that will truly bring us into the information age and set the course for us into the next millennium.

Some institutions of higher education have begun to engage in serious studies related to the processes of inquiry and problem solving and to make real connections between these areas and the teaching and learning process. For example, at the Center for Critical Thinking located in Sonoma State University in Rohnert Park, CA, they submit that teaching any content well is, in fact, teaching it as a mode of thinking. They further suggest that all thinking and teaching is for a purpose and students have to think through that purpose (Center for Critical Thinking, 1994, p. 8). Therefore, good teaching should be an active learning process which engages students in critical thinking at higher levels. To do this, students need reasonable access to information and they need an established criteria against which they can assess their thinking and its potential. Finally, they suggest that sound thinking is focused on a well-formulated question or problem (Center for Critical Thinking, 1994, p. 8). Critical thinking for a professional educator in a sense, should be a mode of inquiry that addresses real life problems. These problems can be solved systematically and with the use of cognitive processes at a variety of levels. In addition, systematic engagement in technological application to solve real life problems can be viewed as an exercise in higher level cognition.

Alice Lloyd College, located in Pippa Passes, Kentucky, has begun to address the need to promote critical thinking processes and to include the use of technology throughout their curriculum. This is evidenced by the fact that faculty are including these areas of concern in course objectives and in their statements of expected outcomes. Each year, faculty refine and develop these skills in their students to bring them to a higher level of intellectual maturity. These efforts, in turn, have produced a higher quality graduate which hopefully will provide a higher level of service.

With this college goal in mind, both cognitive learning theories and applied technology are discussed in an introductory educational psychology class entitled "Human Development and Learning." It was generally believed that a project designed to incorporate critical thinking activities and technology would be of great benefit to the undergraduate teacher education candidate who would be enrolled in this course. Further, in consideration of the rapid changes in society and the fact that traditional textbooks can no longer keep pace with the massive weight of the information explosion, database searching would appear to be the technology to meet these needs. Crane and Markowitz suggest that, "On-line searching involves probiem solving activities and problem solving promotes higher order thinking." (Crane & Markowitz, 1994, p. 43). Students would be asked to define and investigate an instructional problem and conduct an on-line search of a computerized database related to this problem. In addition, students were asked to complete a final written assignment which would connect relationships of citations to the problem, provide an analysis, summarize data, draw conclusions and recommend potential solutions to the problem based on a critical evaluation. The specific objectives of the project included providing students with the opportunity to:

- Engage in critical thinking skills to solve a problem;
- Develop an inquiry strategy by comprehension and application of Boolean logic;
- Identify relationships among citations and connect selected citations to the problem through knowledge and understanding of the topic;
- Describe and provide an analysis of appropriate data and abstract content;
- Demonstrate knowledge of accurate bibliographical documentation;
- Summarize and draw conclusions through an analysis, synthesis, and evaluation of the literature; and
- Develop a final report that provides an introduction, a problem definition and rational, a modified annotated bibliography, a summary of the findings (i.e. content and data), and a statement of conclusions and recommendations for solutions to the problem.

Critical Thinking via Bloom's Taxonomy:

Bloom's taxonomy was identified as providing or delineating distinct levels of cognitive complexity, or higher order thinking skills. Therefore, strategies for the class activity were based on this continuum. Bloom's taxonomy includes a cognitive domain that classifies objectives into six areas or classifications. These classifications are usually presented in hierarchical levels of complexity ranging from the lowest intellectual activity to the highest level of critical thinking. The lowest level, the knowledge level, focuses on the capacity to remember specific concrete or

abstract concepts. Recalling knowledge usually involves simple repetition. Developing an understanding requires higher levels of intellectual activity. The comprehension level requires that the learner interpret a concept and draw conclusions. Often at this stage, the learner can explain or illustrate the concept being presented. In the application stage, the learner begins to apply information or use it in a different context. In this way, transference is required. Transference, along with practice, often affords the student the opportunity to employ a concept and to begin to apply this concept to solve problems.

The next three stages of Bloom's taxonomy; analysis, synthesis and evaluation, are the highest levels of complexity in the critical thinking process. In order for students to truly solve problems of an instructional nature, the ability to do more than just recall previously memorized information is needed. Students must be able to relate these facts to a problem in an analytical way using both inductive and deductive processes. Instructional problems should be broken down into understandable components and the relationship between these parts should be differentiated or related. Synthesis requires a level of creativity. When students engage in synthesis, they are combining parts to form a unique solution to an instructional problem. During the synthesis process, students formulate or produce a new way of solving a problem, often building on other levels of thinking. The evaluation stage, according to Bloom, is the highest level of complexity in the cognitive domain. At this level, a student is able to place a value of worth by appraising or judging ideas based on a predefined criteria. Inferences may be made and courses of action to solve problems are recommended.

Bloom's six distinct levels of cognitive complexity can be incorporated in articulating the use of database searching as a thinking process and linking these levels to systematic problem solving processes. One of the great challenges in database instruction is getting students to think of searching as a systematic process. The more thought put into the front end of a search, the less work will have to be put in on the back end. One of the problems most students encounter is not taking the time to clearly define a topic or problem. They end up wasting time and effort trying to sort through hundreds, even thousands, of article citations looking for the few that apply to the problem they have identified. Instructing students in Bloom's taxonomy and in the techniques of database searching allows them to draw correlations between the two activities so that they may develop an understanding of the correlation between critical thinking and problem solving and how technology supports these endeavors.

Bibliographic Database Instruction:

Students were given a one hour library instruction session in the use of the ERIC Database on CD-ROM. ERIC maintains a listing of current indexed articles in education. Students were instructed in use of the ERIC Thesaurus, parsing, Boolean operators, limiting, and printing. The aim was to provide students with basic competence and confidence so that they would be able to begin an on-line search without additional assistance. They were then asked to conduct searches in teams and to seek out library staff assistance if needed.

Planning is the key factor to engaging in any database search. Searches return references to article citations based on key word descriptors. The more accurately and specifically defined the keywords are; the more relevant the citations will be. Students should begin the search process by developing a list of important key words related to the problem they have defined. The key words should be unique and specific. For instance, a specific term like classroom management will generate a more accurate list of citations than a very general word like discipline. Employing the use of the ERIC Thesaurus will aid students in this effort. The Thesaurus converts natural language terms into a listing of key words ERIC actually uses. In addition, by using ERIC's Thesaurus and limiting capabilities students are able to narrow a topic so that it has a clear focus. Once students have a clear idea of what they are looking for and understand the basics of Boolean logic, they can conduct a search with the minimum of difficulty.

Other searching strategies which help students include the simplified search option available with ERIC, that is very user friendly and easy to use. However, this option but is not adequate for a detailed search. Yet, another strategy students might try when they are beginning a computerized bibliographic search is to simply type in one key term to generate a listing of reference titles. Sometimes this results in a listing of over 1000 citations. It this happens, students should simply scan the listing of titles to identify those most closely related to the defined problem or topic under consideration. These article abstracts can be reviewed for the key words in the descriptors field which can be used to build a more focused search list. This strategy also helps if a topic has been too narrowly defined. If a search results in only a few citations, key words identified in the article abstract descriptors field can be used to broaden the search list. It should be noted that this strategy is not always recommended for use with on-line databases especially if users are charged for access time.

Finally, when a complex or detailed search is needed, Boolean or Advanced Searching techniques must be employed. Boolean searching is fairly technical and often users require some type of formal instruction in this logic. Boolean logic is used to define the limitations of a search.

After key terms have been developed, a search strategy can be formulated. This is where an understanding of the various search strategies and Boolean logic must have been acquired. Users must have an understanding on how the Boolean operators; "And", "OR," and "NOT" are utilized. Delimiters can limit a search by language or publication year. Wild cards substitute for letters or groups of letters. One thing that must be emphasized here. All databases use the same basic logic. However, they tend to use it in different ways. Each system will have its own peculiarities. For instance, the "NOT" operator in some systems is written "AND NOT." Wild cards also tend to change. Some systems use the DOS question mark and star (asterisk). Some use only one of these while others use the dollar sign. This can only be learned by reading the system documentation or asking a librarian.

After executing the search, the student can go through the results and mark all that are relevant. A new key word that may further narrow the search or even take it off in a new direction might still be found. Once citations are marked they can be printed and incorporated into the intellectual project or assignment.

One of the things to emphasize when doing a session on ERIC or any database is that the skills being developed are not confined to one particular class or paper but represent a knowledge base which can be transferred to all types of learning situations. Many students, and particularly educations students, will pursue graduate education. Graduate coursework focuses on research based solutions to problems. Therefore, obtaining database searching skills as an undergraduate provides the student with advantages over classmates that have not.

Figure 1, Blooms Taxonomy by Cognitive Categories and Database Search Activities, identifies the higher order critical thinking skills that students perceived they developed by engaging in the database searching project at the various hierarchical levels.

Figure No. 1
BLOOMS TAXONOMY BY COGNITIVE CATEGORIES AND DATABASE SEARCH ACTIVITIES

Cognitive Categories	Learning Discriptors	Learning Activities
Evaluation	Criticize	beliefs of others and own beliefs
		the information read
		abstracts and contrast methods used
		use title and abstract to pick out most pertinent info
	Examine	citations and solutions to problem
		other options
		several sources of information
	Judge	citations worth for solving problem
		the outcome
		best and worst method to solve problem
		efficiency of data
	Compare & Contrast	other alternatives
		citations
		different information on topics
	Conclude	summary/recommendation
		solutions to the problem
	Critique	citations and their worth
		references to be used
		the finished product
Synthesis	Create	research-based references for solving a problem
		the paper
		a bibliography from a sum of articles
		a well-written document
	Design	appropriate solution
		the format of the paper
	Organize	findings, research
		the information in the paper
		information into logical manner
	Derive	recommendation/solution to problem
		information useful in solving the problem
		a conclusion
		information from abstracts
	Formulate	Boolean equations for search
		a conclusion and opinions
		a plan that may possibly provide a solution

Cognitive Categories	Learning Discriptors	Learning Activities
Synthesis cont.	Compose	combine findings into outline/draft
		the paper
	Write	drafts on findings
		the introduction, summary and conclusion
		the paper
Analysis	Distinguish	best citations to suit problem to be solved
		between abstracts relevant and non-relevant
	Discriminate	good citations and bad citations
		between helpful articles and nonhelpful articles
	Categorize	citations
		articles into some order
		levels of effectiveness of the solutions
		function keys of the computer
	Outline	paper/headings
		paper and sequence of abstracts
	Identify	the problem
		the solution
	Separate	take out useless material
Application	Demonstrate	skill/abilities
		knowledge of subject matter
		examples to show problem
	Explain	what is desired to solve problem
		the problem
	Solve	how to solve the problem
	Calculate	the data
		amount of time to do the project and print it out
	Identify	the problem
		Boolean commands
	Infer	read-between-the-lines
		the data
		the summary
		the information gathered was for all students
	Use	computer skills and research
		the database search program
	Apply	knowledge and skills
		information

Cognitive Categories	Learning Discriptors	Learning Activities
Comprehension	Predict	broadness of the topic, time on computer what the problem is in a statement
	Interpret	data and findings
	Explain	why it is a problem and possible solutions
	Summarize	content of the citations, abstracts conclusions
	Estimate	data how long it will take to solve the problem
Knowledge	List	key words, citations
	Define	the problem, clarify and limit it
	Identify	problem, Boolean words and search strategies
	Recall	commands
	Name	Boolean commands
	Recognize	commands and other computer skills

Profile of the Assignment:

Upon completing the database search, the teacher education candidates were required to produce a final report. As teachers become more involved in decision making processes, accountability measures are requiring them to base decisions and recommendations for solutions to problems on sound empirically based courses of action. Today, through on-line bibliographic retrieval, this process can be made realistic for any educator or decision making committee. The report should include the components mentioned above. Conclusions and recommendations should be drawn from a general consensus of what the review of the literature would suggest. Students were encouraged to use the literature and data findings to make a strong case for their recommendations. In this way, boards of education, grant agencies and the like, would be more inclined to fund a project to address the previously identified problem. In any case, the quality of the final report should be developed to a level where it could be used in this manner. Certainly, as a portfolio piece, it would stand out. This , in turn, would reflect the idea that a student who evidenced higher order critical thinking, systematic planning and technological applications, might be a more attractive candidate for a position in education.

Project Evaluation:

Both a formative and summative evaluation of the critical thinking and database searching project were conducted in order to make improvements as the project progressed. A questionnaire was designed to use as a main component of the summative evaluation to assess student perceptions. This questionnaire was initially developed as a draft instrument and reviewed by a random selection of professional colleagues. Based on their recommendations, a final draft was constructed which consisted of six sections including (1) Participant Profile, (2) Previous Computer Experience, (3) Instructional Value, (4) Components of the Final Project, (5) Search Components, and (6) Free Response. Within the free response section, participants were afforded an opportunity to cite strengths, weaknesses and recommendations or other comments that they wished to provide.

As the target audience who would benefit the most from the research findings were educational practitioners, teacher education candidates and perhaps reference librarian, not necessarily researchers data is presented by simple frequency counts, percentages and weighted scores. Tables and line graphs were also constructed. Analysis of the data is also provided with supporting narrative.

Analysis of the Quantitative Data

The population was a representation of undergraduate teacher education candidates enrolled in an entrance level course in educational psychology from the fall 1995 and spring 1996 terms. They ranged from 19 to 35 years of age; with the majority representing the traditional undergraduate population. Sophomores and juniors made up 85% of the population; only one freshman was included in this group. The greatest percentage of students were females. The population include approximately 37% elementary education majors, 33% secondary education majors and 8% from the middle school area. The remainder were physical education majors.

Previous experience with computers was also of interest. Very few students reported having extensive experience with computers while the majority reporting little to moderate experience. Reported experience in the area of bibliographic searching yielded similar responses. Generally, it can be concluded that most of the students had been exposed to technological applications. Demographic data and reported computer experience is summarized in Table 1.

Table 1
Demographics

Class Standing:	Freshman:	1	(2.17%)	Junior:	15	(32.61%)
	Sophomore:	24	(52.17%)	Senior:	6	(13.04%)
Education Major:	Elementary:	17	(36.96%)	Middle Grades:	8	(17.39%)
	Secondary:	15	(32.61%)	Other (PE, etc.)	6	(13.04%)
Previous Experience:						
Computer:	Extensive:	3	(6.52%)	Little:	13	(28.26%)
	Moderate:	28	(60.87%)	None:	2	(4.34%)
Bibliographic Searching:	Extensive:	4	(8.69%)	Little:	18	(39.13%)
	Moderate:	21	(45.65%)	None:	3	(6.52%)

Participants in the database project were asked to evaluate the overall value and relevance of the instruction provided on bibliographic searching techniques. Approximately 94% perceived the classroom instruction to be good to excellent with the largest majority rating it very good. The relevancy of the materials provided followed similar trends, as did the evaluation of the annotated instructional experience provided in the library setting.

Table 2
Instructional Value Rating

Question:	Excellent	Very good	Good	Fair	Poor
Classroom instruction	23.91%	41.30%	28.26%	2.17%	4.35%
Relevancy	19.57%	47.83%	26.09%	2.17%	4.35%
Library instruction	13.04%	47.83%	30.43%	8.70%	0.00%
Relevancy	10.87%	47.83%	32.61%	8.70%	0.00%

To ascertain whether students had identified various components of importance while engaging in the project and to identify their opinions on the value of the search components as it related to problem solving, various questions were asked. In relation to weighted scores, defining an instructional problem was rated of the highest value. Ninety-eight percent of the respondents either agreed or strongly agreed. Developing a rationale for the topic or instructional problem was also cited as highly significant.

Generally, students placed a high value on constructing a search strategy and organizing descriptors into logical groups. Also, having the opportunity to connect relationships of the citations to the topic or problem allowed them to examine it through analysis in meaning and content. Of equal weight was the opportunity to draw conclusions based on the findings. Overall, the participants viewed all of the component in the exercise to be important. Ratings on the various components of the exercise is summarized in Table 3.

Table 3
Components of the Exercise

Component:	Strongly Agree	Agree	Stongly Disagree	Disagree	Weighted Score
Define instructional problem	36.96%	60.87%	2.17%	0.00%	3.35
Develop rationale for topic	28.26%	65.22%	6.52%	0.00%	3.22
Conduct search	21.74%	76.09%	2.17%	0.00%	3.20
Construct search strategy	19.57%	78.26%	2.17%	0.00%	3.17
Connect relationships	17.39%	80.43%	2.17%	0.00%	3.15
Draw conclusions	19.57%	76.09%	4.35%	0.00%	3.15
Review citations and summarize	21.74%	69.57%	8.70%	0.00%	3.13
Compile descriptors	15.22%	78.26%	6.52%	0.00%	3.09

When examining the overall components of the database project, again, the participants indicated that the final project was very relevant. In addition, the students felt the handouts were very helpful. Citations were also available. The greater majority, approximately 98% agreed or strongly agreed that library assistance was adequate. The search area and computer operations was also adequate although some students disagreed. A summary of the database search project components is provided in Table 4.

Table 4
Database Search Project Components

Component:	Strongly Agree	Agree	Stongly Disagree	Disagree	Weighted Score
Final project was relevant	34.78%	60.87%	4.35%	0.00%	3.30
Handouts were helpful	32.61%	60.87%	6.52%	0.00%	3.26
Citations were available	19.57%	76.09%	4.35%	0.00%	3.25
Library assistance was adequate	19.57%	78.26%	2.17%	0.00%	3.17
Database search area was adequate	13.04%	80.43%	6.52%	0.00%	3.07
Computer operation was adequate	15.22%	76.09%	8.70%	0.00%	3.07
Technical assistance was adequate	10.87%	82.61%	6.52%	0.00%	3.04
Background database information was adequate	10.87%	80.43%	6.52%	2.17%	3.00

Analysis of the Qualitative Information

The free response part of the survey instrument was analyzed by strengths, weaknesses, recommendations and other comments. Many of the strengths cited were related to skills development. One student said, "It taught me a new invaluable skill." Along these same lines, another stated, "The bibliographic searching activity gives students the hands on experience that otherwise would not be experienced until graduate school; this is a vital asset that each student needs and deserve." Many students recognized the transferability of the various skills and learning experiences to other coursework. For example, a participant in the pilot study indicated that, "it helped students find out what kinds of resources there are in the library concerning education and also gave us hands on experience in the problem solving process, from step one (choosing a topic and a hypothesis) to the last step (drawing a conclusion based on our findings)." This would suggest the systematic thinking processes and identifying resources was considered of high value. Managing and limiting these resources was also of value when considering the vast amount of resources available.

There were several comments made dealing with computer literacy as a whole. One student suggested that they were able to, "...learn how to correctly use the computer service and use it in a number of different fields and not just in education." Another pointed out that they found the process to be, "quite user friendly." Many also felt that having a trained person on hand was very helpful, especially to those who were computer illiterate. Some admitted that they were, "so far behind" on technology applications.

After breaking down the search into categories, generally, students found that it was not very hard to conduct a search. Nevertheless, there was a certain identifiable level of

"technophobia," as some students cited their insecurities around the computer. Several of the participants singled out how valuable the reference librarian was in helping them throughout the process. The greater majority of the participants did appear to respect and appreciate both the classroom instruction and the library instruction provided. A typical remark suggested that, "the strengths are the systems and the instruction was good."

Finally, in terms of strengths of the project, many participants did perceive that the project gave them gained experience that would perhaps afford them an edge in the job market. Systematic problem solving and technological applications were felt to be of great benefit in a very competitive market place. The project evidenced a higher level of clinical thought processes and pursuit of more current and up-to-date solutions to pedagogical problems. In essence, it conveyed a profile of a modern teaching professional that could use higher order thinking and contemporary technologically based information retrieval systems.

Weaknesses:

The greater majority of weaknesses identified related to the availabilty of resources which the students felt impacted on their time. Many said that they had to wait in line. Other students indicated, "there are not enough computers in the library or computer lab;" and "access clearly was an issue of concern." One participant said, "waiting on the computers wastes valuable time that students could use." If one looks deeper into these comments and is aware that the Alice Lloyd College is a work-study school where every student works on campus, time becomes a valuable commodity.

Other more experienced computer users commented on the age of the computers and the slowness of the printer and the fact that it sometimes did not work. "It took over an hour for 25 abstracts to be printed out."

A few comments related to the need for clearer instructions on the format of the final paper during the first semester of the project. A sample of a completed project was then put on reserve in the library. Although detailed handouts were provided to the students, compiling annotated bibliographies was fairly new for most of them. The second semester, more classroom time was spent on the concepts which were being introduced and more precise direction on the format of the final document was given.

Recommendations

Throughout both fall and spring semesters, recommendations were very similar. Students strongly encouraged the additional purchase of computers. They indicated that more of the computers on campus needed CD-ROMs to accommodate ERIC and that the databases need to be upgraded more often. There was also a suggestion that access could improve in other ways.

For example, a participant indicated, "instead of spending money on other non-essential things the school should "network" its computer system." Several recommended additional access to the Internet and also to install laser printers. Alice Lloyd College has just recently developed a technology plan that will begin to address some of these recommendations.

Finally, in regards to the database project itself, one student indicated, "This activity was very helpful in learning more about problems in an everyday classroom." One suggested that this project might be the foundation for a senior project. He stated, "A senior project to be completed by each individual should be a requirement for graduation and/or completion of an education program." He went on to say that teachers need more information on current issues and advances in education. Another participant suggested the possibility of providing a class to introduce research on education and how to use it. Based on these observations, it is perceived that teacher education candidates recognize that they will be teaching in an information age and will need to acquire information skills to interface with the ever growing knowledge base that will be available to them. They also appear to realize that as teaching professionals, they will require more scientific research skills to move the profession forward.

Summary

Students involved in the project realized the potential that they would have by becoming oriented to the concepts of critical thinking, the applications of systematic planning and the subsequent utilization of technological applications to problem solving ventures in education. As more technology becomes available and as the teacher is assuming additional decision making responsibilities, more extensive quality instruction will be needed. Certainly, research in this area will benefit teacher education candidates greatly and aid in future program development.

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